Drive Engineering Education towards Better Employability – Need of The Hour

Venkatesh Rajagopala Setty Belagodu
Professor & Coordinator, Department of Management Studies,
Global Academy of Technology, Rajarajeshwari Nagar, Bangalore - 560 098
brvenkatesh@gat.ac.in

Dr. Radha S
Regional Director, IGNOU REGIONAL CENTRE, PANAJI, GOA
dr_radha_s@yahoo.com

ABSTRACT

Earlier education was viewed as a means to transform an individual into a true human being. Aptly said it was “Vidya Viheenam Pashuh Samanam” meaning that “A person without education is just a beast”. Probably today, this may be a debatable issue for known and unknown reasons. Basically education used to be seen as the best means to raise one’s knowledge horizon with the objective of good and service to the society. And today a certificate of qualification is more of a license to work or get employed in a particular field to sustain one’s life. Though this may not be absolutely generalized, exceptions are far and few.

We may observe from the above table that in the year 2012-13, the lion’s share of services to total GDP is from Services at 59.29% while that from industry is 27.03%. In this combined total of 86.32%, the contribution by the engineers is certainly very significant to say the least. Obviously, for this reason, the Government of India and various state governments have been focusing on and given a strong impetus to engineering education in our country. Hence, The Government and the knowledge commission have encouraged growth of engineering colleges in large numbers across the country.

Gone are the days where our high population was considered a weakness. Today, our population is treated as strength in terms of power of the youth, domestic demand for goods & services, possibility of generating high foreign exchange balance in our favor and so on. In this regard, bird’s eye view of the overall human resource would be very partial without considering the engineering discipline.

It is good to note that our Indian hardworking and smart engineers have brought us big fame in the international market through intellectual and financial contributions. Also, the contribution of the engineering fraternity to Indian GDP & economic growth cannot be underestimated or ignored. Looking into all these and the government’s enclosure, engineering institutions have been producing large numbers of engineering graduates every year. India today is the home for about 3500 engineering colleges with around 15 lakh seats being offered in different disciplines.

Unfortunately, the demand side of the equation i.e. the industry is not by & large happy with the quality of today’s engineers. Industry chieftains and various bodies do openly say that only about 25% - 30% of our engineers are employable. Does this mean to say that the system is delivering high quantity of poor quality engineers? Has industry’s expectations gone too high? Is there a mismatch
between the academic output and the industry requirement? Can one infer that the unemployable engineering graduates are either getting underemployed or getting into jobs only to hop till they feel settled?

The author has made an attempt to study the views of all the three primary stake holders, i.e. Engineering Students, Academicians and the Industry Experts with the objective of arriving at probable solutions towards improving the employability of the current engineering graduates.

**Key Words:** GDP, Engineering Institutions, Employability, Engineering graduates, Academicians & Industry experts.

**INTRODUCTION**

The field of education has gone through a sea change right from lower education to higher education. It has evolved through generations and through changes in cultural, technological and economic scenarios. In the process, national limits are no more a constraint but internationalization has become the order of the day. The principle of global village is an accepted phenomenon for the very survival of different nations. With specific reference to India, this is further strengthened by constantly exploding population, ever increasing burden on the national wealth / resources, deep divide between haves and have-nots, changing contributions of different sectors to the GDP pie, olden days’ luxuries being changed to present day’s needs, growing impact of consumerism, expanding middle class and many such parameters to list. All these make it binding to expand just not our trade but our educational system also in global sense.

Global expansion has made the industry to go for technological collaborations, trade negotiations and other related aspects while simultaneously identifying with different languages, cultures and business practices.

Today, we incorporate reforms in teaching methods and pedagogical characteristics to make our students globally competent and competitive. Despite our best efforts and big claims, none of our Indian institutes and universities have made into the global top 100. Probably, international exchange of students and teachers coupled with license free entry of foreign educational institutions will stimulate our deep rooted set up to come out of lumbering attitude and look at the current needs in a fresh and more pragmatic manner.

The demand for engineers has been gradually growing right from 1980s in India irrespective of the specialized fields. The early 1990s saw rapid growth in IT sector and then a true boom in late 1990s. Simultaneously, the expectations of the industry with regard to skills needed in fresh engineering graduates changed based on their respective needs of the time. Earlier, the basic technical skills were sought while elaborate training or orientation used to be given to fresh engineers in the organizations even to the tune of one to two years. But now, engineers with job-ready skills are expected by the industry. National Employability Report (NER) 2011 says that, while India produces more than 500,000 engineers annually, only a meager 3.51 percent are considered job ready that may be directly deployed on projects. Looking at these figures and the claims of Industry chieftains, a large gap in skills seems to exist with reference to industry requirements. An attempt is made by the author to study the three perspectives of students, academicians and the industry experts in finding a probable solution towards bridging the gap between industry requirements and academia deliverables, which in fact is the doctoral research.

Major challenge faced by academicians is to produce engineering graduates who have not just the traditional technical abilities and skills but who also have the necessary soft skills which are much sought by the industry. These non-exhaustively include leadership skills, business insight and
managerial skills while contributing to the growth of the organization. Today’s employers are increasingly focusing on hiring graduate engineers who possess a broader skill-set than in the past. Commercial awareness is also identified as a key employee attribute however students on undergraduate engineering programmes often struggle to understand its significance.

Integrating imparting of additional skills into the curriculum and providing students with placement opportunities and exposure to real time environment have essentially become today’s needs in order to make our engineering students more employable.

REVIEW OF LITERATURE

1. Duyen Q. Nguyen in his study 'The Essential Skills and Attributes of an Engineer: A Comparative Study of Academics, Industry Personnel and Engineering Students' analyzed through survey data on the most essential generic skills and attributes of a modern engineer and concluded on the requirement of technical knowledge and skills and attitudes. His study revealed that the emphasis given to personal and professional attitudes by the industrial sector was interesting and indicates that engineers are not only expected to be technically proficient in the field but also to know how to behave and operate within an organisation. He even pointed out that other generic groups such as intellectual skills and standards of engineering practice were also highly regarded by industry.

2. Meenakshi Sharma, in her paper 'How Important Are Soft Skills from the Recruiter's Perspective' has discussed about the role of soft skills in different managerial roles and weightage of soft skills in promotions. Her study results have shown that industry do prefer people with experience, but they also look for some other qualities in them. Along with technical skills, people who are adaptable and have the zeal to understand and learn new technologies as part of their growth process are sought. She quoted that the interpersonal skills, alignment with the corporate culture, the ability to work as an effective and contributing team member and the political savvy to know how to get things done in the organization also determine a person’s long-term success in an organization. The study revealed that in general, hiring managers are not happy with the new workforce coming out of the colleges and they do believe that they should be much better equipped with soft skills as well as hard skills.

3. In article 'English and Communication Skills for the Global Engineer', Marc J. Riemer, discussed about the communication skills and its importance for engineering graduates for the employability. He quoted in his article that, Language and communication skills are recognized as important elements in the education of the modern engineer, including English for specific purposes. Yet, there seems to be limited implementation of English courses globally, despite its current lingua franca status. Those institutions that have already implemented multilingual and communication elements will be at the forefront of providing the demands of industry and society. The incorporation of several components of the fundamentals of emotional intelligence in education will facilitate advanced communication skills.

4. In the article, 'Sustainable Employability Skills for Engineering Professionals, author V. Saravanan aimed at exploring the skills set required for sustainable employability of engineering graduates in India. His study revealed that as in most of the Indian engineering colleges, students are from different academic backgrounds coming from different places having different mother tongues, there is a need to provide them a common platform to make them competent enough to face the real challenges of today's corporate world. English is the language which can remove the lingual difference among them and give them a common medium to communicate. According to his findings that students with skills like positive attitude, effective communication, problem solving, time management, team spirit, self-confidence, handling criticism, flexibility, etc which are also known as soft skills as a whole, have much more better chances of survival in the tough corporate world compared to the students who are lacking in the soft skills. In the paper author tried to list the skills needed for the students to get employed in reputed companies and has shown how these skills are important for them to work in a performance oriented work environment.

5. In the article 'Enhancing the Employability Skills of Undergraduate Engineering Students' by MARGARET MORGAN and PEARSE O’GORMAN, says that methodology for developing
engineering students at the University delivers the traditional scientific, technical, analytical and mathematical subjects that are fundamental to the area of mechanical and manufacturing engineering but with an emphasis on developing the students’ commercial awareness and communication skills that employers, and beyond, have identified as being so important. Students finishing engineering programmes at the University which focuses on enhancing the employability skills of graduates there by giving them a competitive edge in securing suitable employment, have reported high levels of satisfaction with the extent to which their business awareness and soft-skills have been developed. Finally, employers are very satisfied in that a very high percentage of the graduates obtain suitable employment in graduate positions within a short time of completing their studies. GORMAN has taken ULSAR University for his study and implemented his new method of syllabus on mechanical engineering students and has proved the effect of employability training.

6. Divya Shukla in her article ‘Employability Skill among Professionals – Chagrin of HR Executives in Indian Labor Market: A Study on Engineering Graduates of Bhopal City, has focused on attitude importance in employability. In her study she has discussed on the mushrooming of the technical and professional institutions in India and its resultant into the million of professionals and technocrats’ contribution to the Indian labor market and employability among these pass out. The research paper is an effort to check the status of the employability among the engineering professional of Bhopal City. The objective of the research is to identify the level of employability skill among students, its differences based on the respondents’ demography details and to facilitate suggestive measure to this regard. The data was collected through questionnaire from 291 engineering professionals who are in final year of their BE degree. She analysed the average and moderate level of employability skills among the professionals.

7. In response to the question “How can the Indian industry and academia collaborate to make engineering education better?” by EE Times-Asia*, Jaswinder Ahuja, Vice President & Managing Director, Cadence Design Systems (I) Pvt. Ltd stated as: There are several ways in which to bridge the gap, some of which are detailed below. Industry-academia-government partnership to provide students with valuable practical experience while in college by applying their theoretical knowledge to actual customer problems; The ecosystem needs to work together to constantly update the curriculum of educational institutes for it to be in line with the latest industry developments; Encouraging internship programmes. This imparts hands-on technical, business and soft skills to students in a professional environment and also gives access to a potential workforce to the company.

Responding to the same question, T.V. Prasad, HR Director, Cypress Semiconductor Technology India Pvt. Ltd suggested that some specific steps that can be taken are:

a) Universities/colleges need to constantly review their curriculum and adapt to the changing industry needs.

b) Universities/colleges need to focus much on research involving real technical problems that the industry is trying to solve.

c) State level and district level industry-academia interface bodies need to be initiated

d) Many universities do not have enough faculty. Industry can bridge this gap by asking their employees to do part-time faculty assignments.

e) Industry and academia together can sponsor several innovative challenges/competitions that involve solving technical problems that are current and live in the industry.

The industry and analysts see a growing employability gap for graduating engineers. What is your opinion? In response to this query, Krishna Vedula, Professor of Chemical Engineering, Dean Emeritus of Francis College of Engineering at University of Massachusetts Lowell; former Executive Director of Indo-U.S. Collaboration for Engineering Education with inputs from M.P. Ravindra, Executive Director- IUCEE (India)*; Advisor-E&R, Infosys Technologies Ltd expressed that:

The need to innovate new technologies in collaboration with the users of the technologies has changed the workforce needs of the business world, while the aptitude and talent of the future workforce have changed radically as a consequence of easy access to digital and communications technologies. Although engineering educational institutions in U.S. and India are responding to these changes, many
of them are inhibited by traditional approaches to teaching and research. Engineering education needs to pay more attention to the development of innovation, entrepreneurship and the ability of its graduates to function in a constantly changing global environment. The future of the U.S. technical workforce is challenged by the lack of interest and preparation among its youth for science and engineering careers. At the same time, India has a large number of youth with strong math and science skills interested in engineering careers, but limited by inadequately trained faculty, poor facilities and limited research in a majority of its engineering colleges.

8. M.Vijayakumar & Dr S Ramalingam in their article ‘A study on competency needs analysis and quality factors for fresh recruits’ have attempted to study the methodology and processes involved and the strategies and challenges the companies face during the exercise. They discussed about big gap between what the employers expect and what the candidate show case in terms of employable competencies. They attempted to bring in to lights the factors that are commonly considered in job interview and how those factors fall in order of preference.

9. In the paper ‘An Empirical Study on Expectations of Industry from Academia’, Prof. Neeraj K. Dubey, Dr. Saurabh Goyal, Prof. Ravindra Pathak, Dr.Uday Singh Rajput tried to explore gap between industry expectations and quality of recent college graduates. They tried to create an active interface between industry and academia. In the study they have considered 12 determinants of employability namely-soft skills, leadership qualities, suitability, analytical power, ethical component, dressing sense, language, appearance, manageability, training needs, industry's view and professional commitment. The results indicated the importance of softskills and other criteria along with the basic theoretical knowledge.

10. The study done by FICCI on ‘Industry – Academia Convergence “Bridging the Skill Gap”, talks about the need for effective intervention to understand employer needs, variable sector specific skills, training requirements that improve business performance, articulation of business expectations in education institutions and engagement of industry leaders with higher education institutions. Given its mandate, FICCI through the platform of Industry – Academia Convergence, endeavours to bring together higher education institutions and employers to evolve modalities for collaboration with the aim to meet India’s medium and long – term skills and business needs for the 21st century.

11. In the article 'Engineering education in the context of labour market requirements and expectations - Polish experiences', Agata Pradela has studied on the process of engineering education. The most important issues, challenges and problems connected with higher education are described, such as educational trends, the low quality of education at schools (in the opinion of academics), demographic gaps and the lack of monitoring of labor market requirements. he highlights system solutions of engineering education and activities that support engineering education such as career service, technology transfer, co-operation between employers and universities, and research on matters relating to students’ and graduates’ careers. The author has has come up with the determinants and perspectives of engineering education.

12. SUSAN M. KATZ in her article 'The Entry-Level Engineer: Problems in Transition from Student to Professional' has discussed on the issues of the students transformation problems from the stage of student to professionals. And suggests that many basic skills required in the workplace, including the ability to work on a team and to communicate with one's peers and supervisors, are missing or insufficiently developed in recent college graduates. She quotes that through many employers have programs to overcome these deficiencies, academicians also should consider what best can be done to prepare students for their future roles, and what students themselves can do to ease the transition.

13.Winbladh (2004) in his article ‘Requirement engineering: Closing the gap between academic supply & industry demand’ has focused on the requirement engineering that involves capturing, structuring, and accurately representing the client's requirements in a manner that can be effectively implemented in a system that will conform to the client's specifications. He also suggested project based & collaborative learning to upgrade the students. He concluded that new graduates are ill equipped to enter and survive a market with recessions because they do not exhibit the qualities the qualities that the industry treasures.
14. Eileen M. Trauth in his study 'The IS Expectation Gap: Industry Expectations Versus Academic Preparation', focussed on recent changes in information systems technologies, applications, and industry requirement for tomorrow's IS professionals. He used data from four groups-IS managers, end-user managers, IS consultants, and IS professors-to identify the key skills and knowledge that will be required of future IS professionals. These requirements were then compared with current IS academic programs. The results reveal that despite a shared vision of the future IS professional, there is an "expectation gap" between industry needs and academic preparation. He quotes that Industry and universities must work together to close this gap. Universities need to place more emphasis on the Information Systems Curriculum integration of technologies, applications, data, and business functions and Jess on traditional and formal system development. Firms need to send consistent messages to universities about their expectations while recognizing that the mission of university business programs is career education, not job training.

15. Ghosh et al (2007) discovered that at present, there are several mechanisms operational in India, with 'Academia-Industry interaction,' as a fulcrum of technical education. He focussed that by involving the industries right from the stage of drafting syllabi to absorbing the trained students, they are allowed to shape the CORE into a highly productive Human Resource Centre. This also enables them to reduce the time required to orient a fresh graduate before s/he could be inducted into shop floor and to upgrade/ re-skill their existing employees at a very competitive cost. Zahid (2008) concluded that higher education and industry linkages should remain alive for constant updating of courses. By creating the partnership between universities and industry, both can benefit from resources of each other.

16. Modi (2009) concluded that fresh graduates, who join the industries, require six months to 2 years as gestation period to show their contribution and, many a time, they leave the organisation before they start showing results. This is due to the gap between theory and practice. The industry, R&D labs should become partners with the centres of higher learning.

17. Paliwal (2009) has focussed on coordination among the efforts of academia, industry and the government. He emphasized on instilling the traits which are expected by the prospective employers. Hannan (2003) recommended that faculty-student ratio should be close to 1:10, frequent revision of syllabus in consultation with the industry and institutions should create the professionals with global mind set so that they can adjust in different cultural & social settings.

NEED FOR THE STUDY
We find a phenomenal growth of engineering institutions in India especially after the year 2000. Based on TNN-Times News Network of 28th Feb 2012, India is now home to 3,393 engineering colleges that have 14.86 lakh seats; Further, just 5 states: Maharashtra, Andhra Pradesh, Tamil Nadu, Karnataka and Uttar Pradesh have about 70% tech institutes. With this data on the input end, leading industrialists and NASCOM state that only 15% to 25% of technical graduates are employable. Here rises a natural question that in spite of so many technical institutions producing large number of graduates, why our corporate leaders are not happy with the graduates of the day? Certainly the point is towards the holistic quality and not the quantity.

On one side the Knowledge commission moots for more number of engineering colleges and on the other side, lakhs of seats lie vacant after the admissions are completed. (When admissions closed in the year 2011-12, AICTE estimated that nearly three lakh seats were unfilled).

The consequences of not equipping today’s youth with proper employability skills would be not just harmful in our national perspective but would be disastrous. In the research done by Mckinsey & Company on “Education & Employment”, it is observed that “Employers, Education Providers & Youth live in parallel universes”.

STATEMENT OF THE PROBLEM
What needs to be done to drive today’s engineering education towards better employability?

OBJECTIVES
- To identify the skill sets possessed by the final year engineering students
To know the additional requirements to be met to improve employability of current engineering students.

RESEARCH METHODOLOGY

**Procedure Used To Collect Data:**
As a part of ‘Empirical Study of Engineering Students’ competencies to match Academia Deliverables with Industry Needs” - a doctoral thesis, this paper tries to list the skills needed for the students to get employed and show how these skills are important for them to work in a performance oriented work environment. Data was collected from mainly primary sources: Final Year Engineering Students, Engineering Faculty and Technical & HR heads of different organizations. While secondary data has been utilized only to conceptualize and substantiate the research work. The primary data was collected from the referred three stake holders through structured questionnaires.

**Sample Size:**
Final year Engineering Students: 1100 nos. (From various engineering colleges of VTU)
Engineering Faculty: 200 nos. (From various engineering colleges of VTU)
Industries / Organizations: 21 nos. (Industries catering to both manufacturing and service providing)
As industries are the basic demand creators and end users of the services, Technical & HR heads of over twenty organizations like BHEL Electronic Division, Cisco, Sasken Technologies, Nokia Siemens Networks, Mind Tree, IBM, Infosys, etc, have been considered as sample data for the study. The researcher has considered Technical Skills, Soft skills along with Attitude as the criteria while framing of questionnaires for data collection.

**DATA ANALYSIS AND INTERPRETATION:**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Students’ perspective of expected skills by the industry</th>
<th>No. of students</th>
<th>Sl. No.</th>
<th>Students’ perspective of expected skills by the industry</th>
<th>No. of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Domain Knowledge, latest</td>
<td>427</td>
<td>11</td>
<td>Application of concepts</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Programming languages, C, C++,</td>
<td>164</td>
<td>12</td>
<td>Coding</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Technical skills, Aptitude</td>
<td>101</td>
<td>13</td>
<td>Embedded Systems</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Practical Application</td>
<td>43</td>
<td>14</td>
<td>Innovative Skills &amp;</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Soft skills, Communication Skill, time management, learning skills.</td>
<td>15</td>
<td>15</td>
<td>Networks</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Problems solving, analytical skills</td>
<td>10</td>
<td>16</td>
<td>Basic operating systems</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>VLSI</td>
<td>10</td>
<td>17</td>
<td>Digital Communication</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Conceptual understanding of theory &amp; basic Understanding of components &amp; Equipments.</td>
<td>10</td>
<td>18</td>
<td>Internships in Good Company</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Logical Thinking &amp; Reasoning</td>
<td>9</td>
<td>19</td>
<td>Basics of Analog and Digital Electronics</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Design</td>
<td>8</td>
<td>20</td>
<td>Simulation Language</td>
<td>2</td>
</tr>
</tbody>
</table>
The above table and the graph directly indicate that today’s engineering students at their threshold of graduation perceive Domain Knowledge including latest technology, Programming Skills specifically C, C++, Java, Technical Aptitude & Skills as the most needed parameters for getting employed. An important point to note here is that Practical Applications and Soft Skills which are being viewed as very essential by the industry have taken a back seat in the minds of the students.

<table>
<thead>
<tr>
<th>Skill</th>
<th>Industry Mean</th>
<th>Mean Diff</th>
<th>t value</th>
<th>S. D</th>
<th>Faculty Mean</th>
<th>Mean Diff</th>
<th>t value</th>
<th>S. D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Skills</td>
<td>7.73</td>
<td>1.09</td>
<td>3.48</td>
<td>1.44</td>
<td>6.52</td>
<td>-1.2</td>
<td>-1.25</td>
<td>1.29</td>
</tr>
<tr>
<td>Team &amp; Leadership Skills</td>
<td>8.01</td>
<td>1.87</td>
<td>7.74</td>
<td>1.11</td>
<td>5.94</td>
<td>-2.2</td>
<td>-1.87</td>
<td>1.50</td>
</tr>
<tr>
<td>Decision Making Skills</td>
<td>7.53</td>
<td>1.90</td>
<td>8.39</td>
<td>1.04</td>
<td>5.43</td>
<td>-2.0</td>
<td>-2.13</td>
<td>1.29</td>
</tr>
<tr>
<td>Time Management Skills</td>
<td>8.60</td>
<td>3.20</td>
<td>12.53</td>
<td>1.17</td>
<td>5.07</td>
<td>-3.3</td>
<td>-2.38</td>
<td>1.96</td>
</tr>
<tr>
<td>Execution Skills</td>
<td>7.63</td>
<td>1.83</td>
<td>8.88</td>
<td>.95</td>
<td>5.57</td>
<td>-2.3</td>
<td>-2.55</td>
<td>1.28</td>
</tr>
<tr>
<td>Trainability &amp; Grooming Skills</td>
<td>7.84</td>
<td>2.04</td>
<td>7.66</td>
<td>1.19</td>
<td>5.54</td>
<td>-2.6</td>
<td>-2.73</td>
<td>1.32</td>
</tr>
</tbody>
</table>
The opinion of industry and faculty on the technical abilities possessed by the final year engineering students:

<table>
<thead>
<tr>
<th>Skill Set</th>
<th>Industry Mean</th>
<th>Faculty Mean</th>
<th>t-value</th>
<th>Standard Deviation Industry</th>
<th>Faculty Standard Deviation</th>
<th>t-value</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design and Analysis Skills</td>
<td>7.20</td>
<td>1.83</td>
<td>1.96</td>
<td>6.28</td>
<td>-.07</td>
<td>-.94</td>
<td>1.11</td>
</tr>
<tr>
<td>Programming Skills</td>
<td>7.33</td>
<td>5.30</td>
<td>6.62</td>
<td>5.19</td>
<td>-.25</td>
<td>-1.64</td>
<td>2.18</td>
</tr>
<tr>
<td>Testing Skills</td>
<td>8.28</td>
<td>5.12</td>
<td>11.5</td>
<td>4.25</td>
<td>-1.35</td>
<td>-1.80</td>
<td>2.57</td>
</tr>
<tr>
<td>Instrumentation skills</td>
<td>6.94</td>
<td>4.93</td>
<td>4.50</td>
<td>3.64</td>
<td>-1.64</td>
<td>-1.12</td>
<td>1.83</td>
</tr>
<tr>
<td>Troubleshooting</td>
<td>8.22</td>
<td>4.93</td>
<td>11.4</td>
<td>5.12</td>
<td>-1.80</td>
<td>-1.32</td>
<td>2.21</td>
</tr>
<tr>
<td>Production &amp; Assembly Skills</td>
<td>7.86</td>
<td>4.71</td>
<td>10.7</td>
<td>4.71</td>
<td>-.21</td>
<td>-1.32</td>
<td>2.21</td>
</tr>
</tbody>
</table>

The above table and the related graph indicate the output of Faculty and the Industry response on different technical skill sets as possessed by the students on a ten point rating scale. It is little unexpected to note that Faculty seem to be more conservative in their estimation while industry have expressed a higher order confidence on the students’ technical skills.

The opinion of industry and faculty on the soft skills possessed by the final year engineering students is
Here again, referring to the table and the graph shown afore, the industry has indicated relatively higher mean values against different soft skill sets as possessed by the engineering students vis-à-vis as indicated by the faculty.

It is crucial to note that industry experts opine based on those students who go beyond the cut-off line or percentage, as they appear for written test, aptitude test, GD & interviews. While, the faculty opinion is normally expressed based on the entire student strength who are taught in the class rooms.

**Inputs suggested by Students for Better Employability:**

<table>
<thead>
<tr>
<th>Additional inputs from Institution to make students employable</th>
<th>Change in curriculum</th>
<th>Industry-Institute</th>
<th>More Lab &amp; hands on</th>
<th>Guest lectures</th>
<th>Seminars &amp; conferences</th>
<th>All the above</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs suggested by Students for Better Employability:</td>
<td>2.02</td>
<td>4.02</td>
<td>2.94</td>
<td>1.25</td>
<td>0.58</td>
<td>0.5</td>
<td>0.04</td>
</tr>
</tbody>
</table>

The above table and graph are in response to the question, ‘what changes / additional inputs students expect from the institutions to make them more employable / industry ready’, as rated by the students. They have accorded the highest priority to industry-institute interaction - the one also suggested by the
industry experts & academicians. This is immediately followed by more laboratory exposure / hands-on experience.

When same questions are asked to the academicians (who are the moulders of students to industry-ready professionals) and industry heads (the end users of the skill set possessed by engineering professionals), researcher received very valuable information where-in the three stake holders showed different preferences with different mean percentages as depicted below.

<table>
<thead>
<tr>
<th>Ways to fill the Competence Gap</th>
<th>Industry</th>
<th>Academics</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in curriculum</td>
<td>87.8%</td>
<td>77.5%</td>
<td>21.5%</td>
</tr>
<tr>
<td>Industry-Institute interaction</td>
<td>90.5%</td>
<td>96.0%</td>
<td>36.7%</td>
</tr>
<tr>
<td>More Lab &amp; hands on Exp</td>
<td>90.0%</td>
<td>91.5%</td>
<td>31.1%</td>
</tr>
<tr>
<td>Guest lectures</td>
<td>83.2%</td>
<td>80.5%</td>
<td>17.0%</td>
</tr>
<tr>
<td>Seminars &amp; conferences</td>
<td>77.5%</td>
<td>80.5%</td>
<td>12.0%</td>
</tr>
</tbody>
</table>

Among the industry leaders there is high level of consensus on which way ‘the gap between industry expectations form the final year engineering students and what the students possess actually’, can be bridged. Out of 5 most important ways suggested by the researcher in the form of question to the industry and academicians, the top most 2 reasons are Industry-Institute interaction and More Lab and Hands on experience, which is almost more than 90% among both academics and industry respondents. Similar perception is existed among the students also.

For an open ended question on what additional efforts are required to raise the competency levels of fresh engineering recruits, the industry heads and the academicians have responded suggesting a few significant inputs towards specific training on few areas like Motivation workshops, Lectures by industry and academic experts, Efficient implementation of development programs, Conducting of more aptitude tests and Real time projects, Group activities on industry related case studies and project works. Furthering these, few of the very interesting points are to implement: Exploring areas beyond the curriculum, Encouraging students on research publications, Imparting practical knowledge on current technology, Training on Stress Management, Change Management & Time management,
Focusing on holistic personality development, Bringing Awareness of Industry Standards and Learning Corporate etiquette at Student level.

CONCLUSION:

In general parlance, we are aware that education in general leads to raising the knowledge of the person and also it provides him an ethical way of employing and engaging oneself to sustain his / her life and grow further. In the process, education provides means for both an individual’s growth and societal development in the right sense. Especially in the case of Engineering Education, it provides all the above hopefully in an accelerated pace for the good of the nation.

While conducting the study, the researcher has just not focused on gathering the opinion and consolidating the same but also attempted to seek probable solutions / suggestions towards making the current young engineers more / better employable in the current situation. These suggestions are sought from all the three stake holders, i.e. Students, Faculty and the Industry experts as they constitute the inputs, processing body and the end user respectively.

It is very pleasant to note that all the three stake holders do agree with suggestive points in unanimity though there looks to be little variation in percentage of each stake holder suggesting different solutions or suggestions.

**Industry-Institute-Interaction and More Laboratory & Hands-on experience** stand out significantly among all the suggested parameters from both the faculty and the industry sectors at a level more than 90%, while the other suggestions such as change in curriculum, guest lectures and seminars & conferences are found at comparable percentages. One vital point to observe is that the students though have indicated the same pattern of suggestions, their respective percentage being in the range of less than 37% (in comparison with the other responses), probably, it may be concluded that lack of exposure and experience of students to the actual world could be the reason for such a response.

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